

REMARKS

Claims 1 and 22-40 were pending in the application. Claim 41 has been added herein. No new matter is being added.

Claims 1 and 22-40 have been rejected under 35 U.S.C 103(a) as being unpatentable over Johansson, et al. (U.S. Patent No. 5,277,764), Andersson, et al. (U.S. Patent No. 5,607,552), or Keiser, et al. (U.S. Patent No. 6,486,216). This rejection is respectfully transversed.

The present invention relates to silica-based sols for use in papermaking. Specifically, the invention discloses silica-based particles and sols containing silica-based particles with high drainage and retention performance, high stability and high solids content.

Johansson discloses colloidal silica or silica sol having a S-value of 8 to 45%; $\text{SiO}_2:\text{M}_2\text{O}$ ratio of between 20:1 to 75:1, and a specific surface area of between 10 and 1000 m^2/g .

Andersson discloses aqueous suspensions of colloidal particles, which are both silica-based anionic particles and hydrated particles of clays of smectite type, which are expandable in water. The suspensions disclosed in the examples are prepared from silica sol and Na-bentonite.

Keiser discloses stable aquasol containing colloidal silica having a S-value of 20 to 50%; $\text{SiO}_2:\text{Na}_2\text{O}$ ratio of between 13:1 to 17:1, and a specific surface area of between 700 and 1100 m^2/g . The aquasols have % by weight SiO_2 levels from about 7.00 % to about 16.80 %.

Thus, Johansson discloses silica based sols or silica sol, Andersson discloses an aqueous suspension of colloidal particles, which particles are both silica-based anionic particles and swollen particles of smectite type clays, and Keiser discloses aquasol.

A person of ordinary skill in the art, when trying to improve dewatering in papermaking, would not have any motivation to combine the different inventions in the cited prior art in order to develop an aqueous sol containing silica-based particles having the combination of parameters as defined in the present claims, and there is no disclosure, suggestion or teaching in the cited art, either alone or in combination, regarding how to produce such an aqueous sol.

It was asserted in the rejection that "since viscosity is dependent on such factors as particle size and surface area, it is obvious that since the S-values and specific surface area of the above prior art sols are within the claimed range, the prior art obviously encompasses the claimed viscosity". This is simply not true.

The different parameters of an aqueous sol containing silica-based particles are not independently changeable. For instance, in prior art products, it is generally not possible to increase the silica content and, hence, the viscosity of an aqueous sol containing silica-based particles without risking aggregation and precipitation of the contained silica-based particles. Further, such an increase also affects the specific surface area of the contained silica-based particles. In addition, the S-value is usually affected dramatically. Since the S-value is a function of silica content, viscosity and density, if the silica content is changed, then viscosity and density will also change. Further, the S-value is not applicable to aqueous suspensions of both colloidal silica-based particles and hydrated particles of smectite type clay, such as that disclosed by Andersson.

As admitted in the rejection, none of the references disclose viscosities, nor do any of the references disclose densities. A person of ordinary skill in the art would not be able to determine any viscosity out of the disclosed parameters, and would further not be able

to combine any of the information extracted from the various references since it would require one to combine some of the parameters from one sol with some additional parameters from a different sol.

For the reasons set forth above, the claimed aqueous sol containing silica-based particles according to claims 1 and 22-41 is non-obvious over Johansson, Andersson, and Keiser, either alone or in combination. The Applicants respectfully request reconsideration of the rejection and a finding that the claims are in condition for immediate allowance.

Respectfully submitted,
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